

# इंटरनेट

# मानक

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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 10249-2-1 (1983): Voltage Dependent Resistors (Varistors), Part 2: Low Voltage, Section 1: Type VDF 1 [LITD 5: Semiconductor and Other Electronic Components and Devices]



“ज्ञान से एक नये भारत का निर्माण”

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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard



SPECIFICATION FOR  
VOLTAGE DEPENDENT RESISTORS ( VARISTORS )

PART 2 LOW VOLTAGE

Section 1 Type VDF 1

0. General — This standard ( Part 2/Sec 1 ) shall be read in conjunction with IS : 10249 ( Part 1 ) - 1982 'Voltage dependent resistors ( varistors ) : Part 1 General requirements and methods of tests'.

1. Scope — This standard covers the detail requirements for varistors, low voltage, disc types, non-insulated with terminations.

2. Outline Drawing and Dimensions — The outline drawing and dimensions shall be in accordance with Fig. 1 and Table 1.

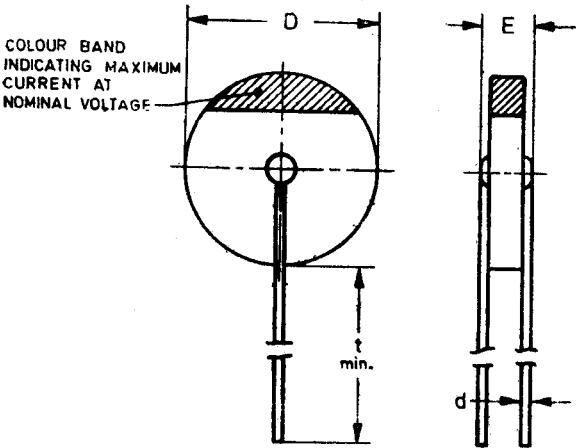


FIG. 1 OUTLINE DRAWING AND DIMENSIONS

TABLE 1 DIMENSIONS AND RATINGS

SI No.	Style	Nominal Dissipation at 25°C (mW)	Nominal Voltage V	Temperature Co-efficient Percent/°C (Max)	Dimensions, mm			
					D	E	t (Min)	d
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	VDF1-1	1 000	48	0.8	17 + 2 / - 1	4.5 ± 1.5	35	0.8 ± 0.08
ii)	VDF1-0.4	400	48	0.8	12 + 2 / - 1	4.5 ± 1.5	35	0.8 ± 0.08
iii)	VDF1-0.25	250	48	0.8	10 + 2 / - 1	4.5 ± 1.5	35	0.8 ± 0.08

3. Ratings and Characteristics — The electrical ratings and charectaristics shall be as specified in Tables 1 and 2.

4. Environmental Classification

- a) Temperature severity
- 25/55/21
- b) Damp heat severity
- 21 days
- c) Air pressure ( low )
- 1 kPa
- d) Acceleration ( steady state )
- 1 km/s<sup>2</sup>
- e) Vibration
- 10—2 000 Hz, 200 m/s<sup>2</sup> 12 h
- f) Shock
- 1 km/s<sup>2</sup>

TABLE 2 RATINGS AND CHARACTERISTICS

( Clause 3 )

VDF1-1			VDF1-0·4			VDF1-0·25		
Colour Band Indicating Maximum Current at Nominal Voltage (mA)	Maximum Current at Nominal Voltage (mA)	Current for Efficiency Test (mA)	Colour Band Indicating Maximum Current at Nominal Voltage (mA)	Maximum Current at Nominal Voltage (mA)	Current for Efficiency Test (mA)	Colour Band Indicating Maximum Current at Nominal Voltage (mA)	Maximum Current at Nominal voltage (mA)	Current for Efficiency Test (mA)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Black	0·5	42	Black	0·5	27	—	—	—
Brown	0·9	76	Brown	0·9	44	—	—	—
Red	1·7	115	Red	1·7	65	Red	1·7	52
Orange	3·0	180	Orange	3·0	91	Orange	3·0	72
Yellow	5·0	268	Yellow	5·0	152	Yellow	5·0	121
Green	9·0	360	—	—	—	—	—	—
Blue	15·0	455	—	—	—	—	—	—

5. Marking — See 6 of IS : 10249 (Part I)-1982.

6. Material Construction and Workmanship - See 4 of IS : 10249 ( Part I)-1982.

## 7. Tests

### 7.1 Classification of Tests

7.1.1 Type tests — The sequence of type tests and grouping of samples for type approval shall be in accordance with Table 3.

7.1.1.1 Number of samples -The manufacturer shall submit 30 samples of the highest maximum current value and 30 samples of the lowest maximum current value in each style.

TABLE 3 TYPE TESTS

Group	Test	No. of Samples		Clause Ref in IS : 10249 ( Part 1) - 1982
		Lowest Current Value	Highest Current Value	
(1)	(2)	(3)	(4)	(5)
0	Visual examination			8.2.1.1
	Outline dimensions			8.2.1.2
	Current at nominal voltage	30	30	8.1.1
				8.2.7
1	Solderability			
	Robustness of terminations			8.2.2
	Bump	4		8.2.3
	Vibration			8.2.4
	Shock			8.2.5
	Acceleration ( steady state )			8.2.6
2	Rapid change of temperature			8.3.5
	Climatic sequence			8.3.1
	Damp heat ( steady state )		4	8.3.2
3	Endurance ( electrical )		4	8.4.3
	Flammability			8.4.2
4	Over load		4	8.1.4
	Mould growth			8.3.3
5	Resistance to solvents		4	8.4.1
	Resistance to soldering heat			8.2.8
	Efficiency			8.4.5
6	Temperature coefficient	4	4	8.1.5
	Salt mist test			8.3.4
7	Endurance operational	4	4	8.4.4
	Spares	2	2	

**7.1.2 Routine tests** — Following tests shall constitute routine tests:

- a) Visual examination, and
- b) Current at nominal voltage.

**7.1.3 Acceptance tests** — These tests shall be performed on the varistors that have passed the routine tests specified in 7.1.2. Two groups of samples (Groups A and B ) shall be selected and the varistors shall be subjected to the tests in the order given in Table 4.

TABLE 4 ACCEPTANCE TESTS

SI No.	Test	Clause Ref n IS : 10249 ( Part 1 ) - 1982	AQL* ( Percent Defective )	Inspection Level	D/ND
(1)	(2)	(3)	(4)	(5)	(6)
i) Group A					
a) Outline dimensions		8.2.1.2	1	II	ND
ii) Group B					
Sub-group B1					
a) Temperature co-efficient		8.1.5			
b) Overload		8.1.4	4	S <sub>3</sub>	ND
Sub-group B2					
a) Efficiency		8.4.5	4	S <sub>3</sub>	D
c) Solderability of terminations		8.2.2			
d) Bump		8.2.3			
e) Climatic		8.3.1			
Sub-group B3					
a) Endurance electrical ( 168 h )		8.4.3	4	S <sub>3</sub>	ND

D = Destructive

ND = Non-destructive

Note 1 — Samples subjected to destructive tests and those having failed in non-destructive tests shall not be returned to the lot.

Note 2 — For each group/sub-group separate samples shall be drawn.

\*See Sampling plans and procedures for inspection by attributes for electronic item (under preparation).

**7.2 Methods of Tests** -The general test conditions and methods of measurements of the requirements shall be in accordance with IS : 10249 ( Part 1 ) - 1982.

7.2.1 The test schedule with test conditions and requirements after each test, applicable to varistors covered by this standard, shall be in accordance with Table 5.

TABLE 5 TEST SCHEDULE AND REQUIREMENTS

SI No.	Test	Clause Ref in IS : 10249 ( Part 1 ) - 1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
i) All Samples				
a) Visual examination		8.2.1.1		The condition workmanship and finish shall be satisfactory. The markings shall remain legible and indelible.
b) Outline dimensions		8.2.1.2		The dimensions shall conform to the values given in Table 1 and Fig. 1
c) Current at nominal voltage		8.1.1	Nominal voltage $48 \pm 0.1$ v	This shall not exceed the values specified in Table 2 for various styles
ii) First Group				
a) Solderability		8.2.7		The requirements shall be as specified in IS : 9000 ( Part 18/Sec 1 ) - 1981*

\*Basic environmental testing procedures for electronic and electrical items: Part 18 Solderability test, Section 1 Solderability of wire and tag terminations.

( Continued )

TABLE 5 TEST SCHEDULE AND REQUIREMENTS —Contd

Sl No.	Test	Clause Ref in IS : 10249 ( Part 1 )-1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	<b>b) Robustness of terminations</b>	8.2.2		—
	1) Visual examination	8.2.1.1		There shall be no breaking or loosening of terminations or other evidence of mechanical deterioration
	<b>c) Bump</b>	8.2.3	4 000 bumps, 400 m/s <sup>2</sup>	—
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration
	<b>d) Vibration</b>	8.2.4	10-2000 Hz, 200 m/s*, 12 h	
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration
	<b>e) Shock</b>	8.2.5	1 km/s <sup>2</sup>	
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration
	<b>f) Acceleration ( steady state )</b>	8.2.6	1 km/s*	
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration
	<b>g) Rapid change of temperature</b>	8.3.5	25/55	—
	1) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration
	2) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm 30$ percent
	<b>h) Climatic sequence</b>	8.3.1		
	1) Temperature ( dry heat )	8.3.1.2	At maximum category temperature	
	2) Damp heat ( cyclic )	8.3.1.3	One cycle	
	3) Temperature ( cold )	8.3.1.4	At minimum category temperature	
	4) Low air pressure (not applicable to varistors for use in ground applications )	8.3.1.5	For 1 h during the last 5 minutes of the test, the specimens shall be loaded for 50 percent of the rated dissipation, subject to low air pressure voltage limitation	There shall be no breakdown or flash-over
	5) Damp heat ( cyclic )	8.3.1.6	Remaining cycles (one)	
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deteriorations. The markings shall remain legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm 30$ percent
iii)	<b>Second Group</b>			
	a) Damp heat ( steady state )	8.3.2	21 days	There shall be no fracture, loosening of parts or other mechanical deterioration. The marking shall remain legible and indelible
	1) Working test		Within 15 minutes after removal from the chamber. The specimens shall be loaded for rated dissipation for 1 minute	There shall be no breakdown or flash-over
	2) Visual examination	8.2.1.1		
	3) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm 30$ percent

( Continued )

TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref IS : 10249 ( Part 1 )-1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
iv)	<i>Third Group</i>			
	a) Endurance electrical	8.4.3	At 25°C	
	1) intermediate measurements	8.4.3.1	At the end of 1 h off period and recovery period of 4 h $\pm$ 30 minutes	
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm$ 20 percent
	2) Final measurements	8.4.3.2		
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm$ 20 percent
	iii) Efficiency	8.4.5		The maximum voltage measured across the terminals of the varistor during the test shall not exceed the value specified in SI No. vii (a)
	b) Flammability	8.4.2		The requirements shall be as specified in IS : 9000 ( Part 21/Sec1)*
v)	<i>Fourth Group</i>			
	a) Overload	8.1.4		
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deteriorations. The marking shall remain legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm$ 10 percent
	b) Mould growth	8.3.3		The requirements shall be specified in IS : 9000 ( Part 10) -1979†
vi)	<i>Fifth Group</i>			
	a) Resistance to solvents	8.4.1		The marking shall remain legible and shall not smear or sub off. There shall be no evidence of mechanical deterioration
	b) Resistance to soldering heat	8.2.8		
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm$ 5 percent
vii)	<i>Sixth Group</i>			
	a) Efficiency	8.4.5		The maximum voltage shall not exceed 145 v
	b) Temperature coefficient	8.1.5	Procedure followed	0.8 percent/deg C ( Max )
	c) Salt mist test	8.3.4		
	i) Visual examination	8.2.1.1		There shall be no corrosion or loosening of parts or other mechanical deterioration. The markings shall remain legible and indelible

Basic environmental testing procedures for electronic and electrical items:

\*Flammability test, Section 1 Glow-wire test ( under preparation ).

†Mould growth test.

( Continued )



TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref IS : 10249 (Part 1 )-1982	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
viii) Seventh Group				
	a) Endurance operation	8.4.4		—
	i) Visual examination	8.2.1.1		There shall be no fracture, loosening of parts or other mechanical deterioration. The markings shall <b>remain</b> legible and indelible
	ii) Current at nominal voltage	8.1.1		The change in current at nominal voltage shall not exceed $\pm 20$ percent
	iii) Efficiency	8.4.5		The maximum voltage measured across the terminals of the varistor during the test shall not exceed the value specified in SI No. vii (a)

## EXPLANATORY NOTE

While preparing this standard, assistance has been derived from JSS 50651, issued by the Ministry of Defence, India.